

MISCELLANEOUS NOTES

been suggested that the Sariska infection may have originated from migrating cattle, which used to move from Gujarat through Sariska to the Jamuna Valley (Fateh Singh, pers. comm. 1985). Such movements are no longer permitted.

What should or could wildlife managers do about such infections? The answer is almost certainly 'nothing'. Treatment amongst cattle is difficult. Eradication from a wild ungulate population would be impossible without the unacceptable policy of culling infected animals. Animal condition and reproductive parameters do not seem to be affected. Managers should, however, monitor incidence of infection, and body condition amongst wild animals and domestic cattle given grazing rights in wildlife

areas. If infection rates markedly increase and body condition and reproductive performance are seen to decrease as a result, then management action may become necessary.

There is no hard evidence to link this ear-sore infection, or the 1968 outbreak of haemorrhagic septicaemia in Sariska sambar to past migratory cattle. However such poor condition cattle populations almost certainly do act as reservoirs of pathogens, and their passage through major wildlife areas should be prevented.

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W. A. RODGERS

WILDLIFE INSTITUTE OF INDIA,
P. O. NEW FOREST,
DEHRA DUN-248 006,
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REFERENCES

HIREGODAR, L. S. (1974): A note on ear-sore due to *Stephanofilaria* among nilgai in Gir forest of Gujarat State. *Ind. Vet. J.*, 51.

HIREGODAR, L. S. & CHATUPALE, W. V. (1965): Incidence of *Stephanofilaria assamensis* Pande 1936, in Gujarat State. *Ind. Vet J.*, 42: 808-809.

7. A SCANNING ELECTRON MICROSCOPE STUDY OF THE HAIR KERATINS OF SOME ANIMALS OF THE INDIAN SUBCONTINENT — A PRELIMINARY REPORT

(With fifteen figures in eight plates)

This study examines the surface structure and cross sections of the hair keratins of some animals with the Scanning Electron Microscope (SEM). The conventional technique of embedding hair in suitable media and studying their structure with the ordinary optical microscope often results in optical artifacts especially with unstained specimens. These can be avoided with the SEM. The hair

keratins show significant differences particularly in cross section and we feel that the use of the SEM can provide valuable additional data.

INTRODUCTION

The determination of the structure of hair is of great interest since it affords a method of identification of the particular animal from which it has originated. It is one of the re-

liable methods adopted for establishing predator-prey relationships by systematically identifying the prey from the hairs in the faeces of the predator (Schaller 1969). The usual method employed for structure determination is to mount the hair in a suitable medium (Koppikar and Sabnis 1976) or make a replica of it (Korschgen 1981) and view the slide in an optical microscope. The relative thicknesses of the cortex and medulla and their refractive indices at different points on the same hair are such that optical artifacts can easily arise, especially since the samples are viewed without staining them.

For instance, if the refractive index at any region is the same as the surrounding medium, the region will not be differentiated. Depending on the thickness and the refractive index, the medial regions may show some pattern resulting from the passage of light through the cortex and medulla. The surface scale pattern *per se* is seen only at the edges and at the tip of the hair where the material is sufficiently thin. The use of the SEM can overcome these inherent defects in observations with the optical microscope since it gives an image of the surface alone. The SEM also gives higher resolution, vastly improved depth of focus and continuous magnification up to 10,000 or more. In this preliminary study, the surface structure and cross sections of hair keratins from some animals of the Indian subcontinent are studied.

MATERIALS AND METHODS

Hair samples have been obtained from the rump portion of adult males unless otherwise mentioned. The samples were cleaned in isopropyl alcohol in an ultrasonic bath for three minutes to remove surface dirt. Those samples whose cross sections were to be studied were

stuck to cellophane paper and the cross sections were exposed by cutting with a new blade. These were mounted on to aluminium stubs with conducting silver paint. The samples were coated with gold in a sputter coater to a few angstroms thickness to make the surfaces conducting for observation in a Cambridge Stereoscan S 150 SEM.

RESULTS AND DISCUSSION

Figures 1 to 15 depict the cross sections and surface features of the various hair keratins studied. The differences between the various species is very evident especially in the cross sections. All hair keratins have the free ends of their cuticular scales sloping towards the tip or distal end of the hair. In the porcupine quill however, the scales point towards the root (Fig. 5b). This is functionally very significant. The quill is a weapon of defence and it penetrates skin and muscle. Since the scales point away from the sharp tip, they do not hinder the penetration and once the quill has pierced the tissue, the scales would resist the withdrawal of the quill. The cross section of the quill shows that it is also tubular (Fig. 5a) with a spongy medulla surrounded by a solid cortex which affords high strength in compression in the functional state when the quills are driven into the body of the predator. There are many notable differences in the structure of other keratins as well. A medulla is absent for some hairs like the Lion-tailed macaque (Fig. 1a), the buffalo (Fig. 7a), the hog hair bristle (Fig. 14a) and in human hair (Fig. 15a). All these have a small pore at the centre with the bear (Fig. 4a) having a rudimentary medulla. Cow hairs (Fig. 6a, b) show regions where the medulla may be present or absent. The presence of a solid cortex affords stiffness to the hair. Thus hog hair

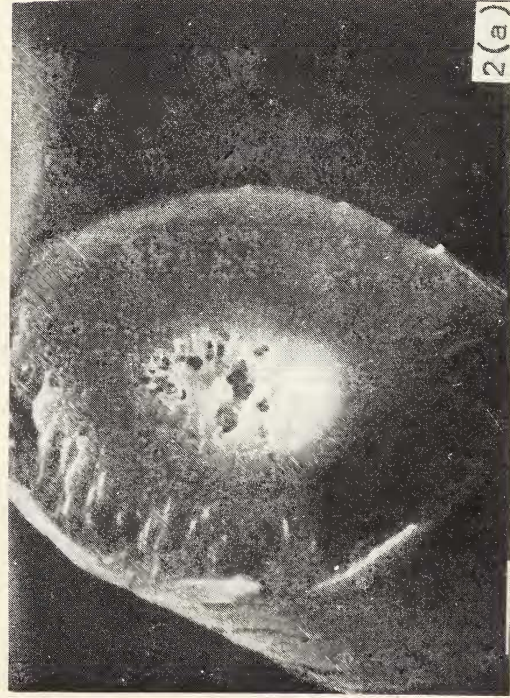
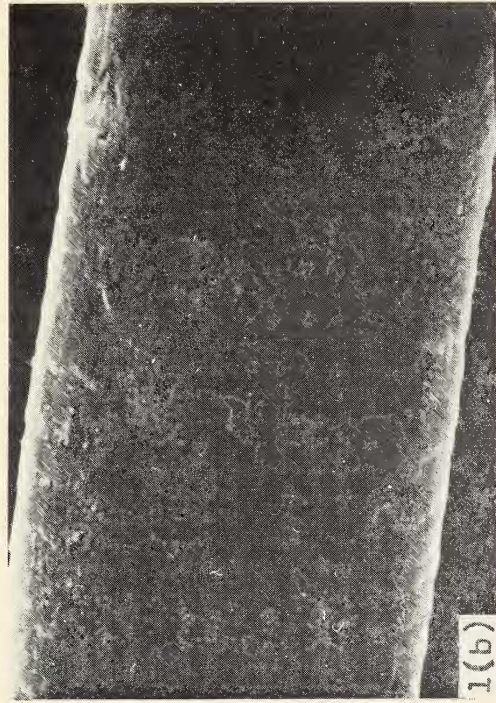
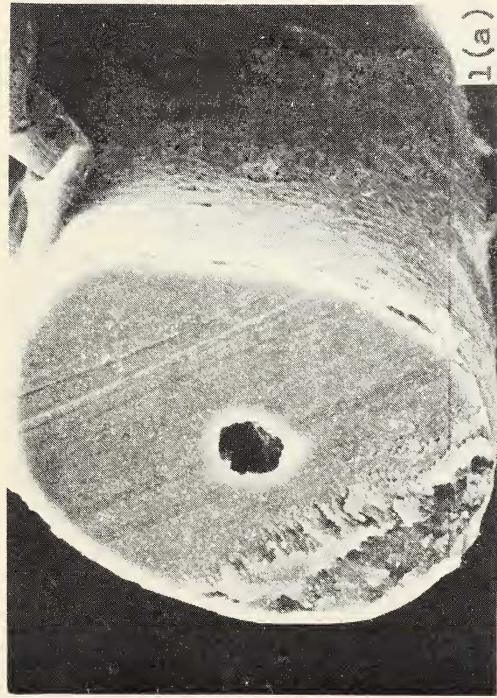


Fig. 1. Lion tailed macaque (*Macaca silenus*) — a. Cross section (X 475); b. Surface (X 800).
Fig. 2. Tiger (*Panthera tigris*) — a. Cross section (X 1200); b. Surface (X 1000).